LMS/RFS/S04512-0.1

Rocky Flats, Colorado, Site Vegetation Management Plan

January 2009

U.S. DEPARTMENT OF ENERGY | Office of Legacy Management

This page intentionally left blank

LMS/RFS/S04512-0.1

U.S. Department of Energy
Office of Legacy Management

Rocky Flats, Colorado, Site
Vegetation Management Plan

This page intentionally left blank

Contents

Tables

This page intentionally left blank

1.0 Introduction

The Rocky Flats Site (Rocky Flats) is under the jurisdiction of the U.S. Department of Energy (DOE) Office of Legacy Management (LM). S.M. Stoller Corporation, the DOE-LM Legacy Management Support contractor, conducts long-term surveillance and maintenance activities at Rocky Flats. Vegetation management activities are conducted as part of the surveillance and maintenance activities, which include activities conducted pursuant to the Rocky Flats Legacy Management Agreement. This agreement established the regulatory framework to implement the final response action selected and approved in the Rocky Flats Corrective Action Decision/Record of Decision under the Comprehensive Environmental Response, Compensation, and Liability Act; the Resource Conservation and recovery Act; and the Colorado Hazardous Waste Act to ensure that the response action remains protective of human health and the environment.

The vegetation management goal at Rocky Flats is to exercise good stewardship for preservation of the natural resources while complying with applicable federal, state, and local regulations. The program incorporates an integrated ecosystem approach to natural resource management utilizing as many management techniques as possible. This Vegetation Management Plan uses an integrated framework of techniques to control excessive vegetation that can increase wildfire hazards, to control present and future infestations of noxious weeds, and to enhance the native plant communities and wildlife habitat.

Some vegetation management actions are regulated by law, but various levels of control are required depending upon the species to be controlled. Other vegetation management actions serve dual purposes of controlling the spread of invasive weeds and reducing the accumulation of fuels that can carry uncontrolled wildfires across Rocky Flats and into nearby areas. Invasions of nonnative vegetation at Rocky Flats are degrading existing habitat quality in the undisturbed areas and are reducing the coverage of the site's high-value vegetation communities. The lack of grazing and long-term suppression of wildfires, combined with the past prohibition of prescribed burning at Rocky Flats (including cessation of burning of accumulated vegetation debris out of fences), has allowed a heavy accumulation of fine fuels. This has increased the risk of uncontrolled wildfires.

By controlling excessive weed growth and mowing vegetation, fuel accumulation is reduced, and the sitewide noxious weed control effort is enhanced. These vegetation control efforts also reduce the secondary seed source from noxious weeds that grow in disturbed areas of Rocky Flats.

Although no single weed control strategy will completely remedy the noxious weed problems at Rocky Flats, this plan seeks to integrate various techniques to provide effective weed control and enhanced wildfire protection, while minimizing environmental damage and optimizing the use of available resources (Table 1). Some vegetation management actions are important from the standpoint of reduction of biomass that would otherwise provide fuel for wildfires; others are more important from a resource management perspective.

Table 1. Weed Control Methods for Rocky Flats

Treatment Option	Control Method
Administrative controls	Administrative policies and procedures
Cultural controls	Revegetation requirements
Physical or mechanical controls	Mowing
	Prescribed burns
	Hand-pulling
Biological controls	Biological control insects
	Grazing
	Interseeding
Chemical controls	Herbicide applications

Weed problems on surrounding lands are also of concern. Without great expense, it is difficult or impossible in the long term to maintain a weed-free island surrounded by weed-covered lands. Establishing cooperative agreements and working with surrounding landowners is necessary to address more regional weed issues that cannot be effectively controlled solely by individual landowners. The Site will remain in contact with surrounding landowners and work together to help control noxious weeds on DOE-LM land and adjacent properties. When observations of noxious weeds warrant, the Site will contact landowners of adjacent properties, report observations, and request that actions be taken to address problem areas.

2.0 Weed Control Strategy

2.1 Weed Control Program

Vegetation management at Rocky Flats includes integration of the noxious weed control efforts with other means of vegetation control necessary for health and safety, resource conservation, and wildfire control. Most noxious weeds invade ecosystems because of disturbance, degradation, or changes in the natural system that alter resource availability, thus making the plant community more prone to invasions (Davis et al. 2000). Long-term control of these noxious weeds will ultimately depend on restoring the natural processes (e.g., fire, grazing) that originally kept the ecosystem healthy. However, weed control is a critical component of an integrated management approach because it focuses efforts directly on the undesired species.

2.1.1 Weed Control Planning

A total of 30 species of Colorado state-listed noxious weeds are known to occur or have historically occurred at Rocky Flats (Table 2). However, not all species are slated for control. Many of the state-listed species are only found at isolated disturbed locations and are not presently having an impact on the native plant communities or revegetation locations at Rocky Flats. Many of these species are also not aggressive, invasive species (under current conditions at the site) and are therefore not currently high-priority species for control.

At Rocky Flats, the species with the greatest potential to affect the native plant communities and greatest difficulty of control are annual rye, Canada thistle, dalmatian toadflax, Dame's rocket, diffuse knapweed, Russian knapweed, Scotch thistle, tamarisk, jointed goatgrass, and yellow

starthistle. (**Note**: the list is in alphabetical order. Yellow starthistle was found once and pulled and has never been observed again). The aggressive nature of these species and their ability to dominate and degrade the native plant communities makes control especially important.

Table 2. Noxious Weeds Occurring at the Rocky Flats Site

Common Name	Scientific Name	CO Noxious Weed List[a]	CO List[b] (A, B, or C)	CO State Management Plan Goal[c]	JeffCo[d] Noxious Weed List/ Control	Rocky Flats Weed Problem[e]
Annual rye	*Secale cereale*	N	NA	NA		Y
Bird's-foot trefoil	*Lotus corniculatus*	N	NA	NA		Y
Bouncingbet	*Saponaria officinalis*	Y	B	NA		Y
Bull thistle	*Cirsium vulgare*	Y	B	NA		Y
Canada thistle	*Cirsium arvense*	Y	B	NA	Y/Control	Y
Chicory	*Cichorium intybus*	Y	C	NA		Y
Common burdock	*Arctium minus*	Y	C	NA		N
Common mullein	*Verbascum thapsus*	Y	C	NA		Y
Common St. Johnswort	*Hypericum perforatum*	Y	C	NA		Y
Crown vetch	*Coronilla varia*	N	NA	NA		Y
Dalmatian toadflax	*Linaria dalmatica*	Y	B	NA		Y
Dame's rocket	*Hesperis matronalis*	Y	B	NA		Y
Diffuse knapweed	*Centaurea diffusa*	Y	B	Suppression	Y/Control	Y
Downy brome	*Bromus tectorum*	Y	C	NA		Y
Field bindweed	*Convolvulus arvensis*	Y	C	NA		Y
Hoary cress	*Cardaria draba*	Y	B	NA	Y/Control	Y
Houndstongue	*Cynoglossum officinale*	Y	B	NA	Y/ Control	Y
Jointed goatgrass	*Aegilops cylindrica*	Y	C	NA		Y
Leafy spurge	*Euphorbia uralensis*	Y	B	NA	Y/Control	Y
Lens-padded hoary cress	*Cardaria chalepensis*	N	NA	NA		Y
Mayweed chamomile	*Anthemis cotula*	Y	B	NA		N
Moth mullein	*Verbascum blattaria*	Y	B	NA		N
Musk thistle	*Carduus nutans*	Y	B	NA	Y/Control	Y
Oxeye daisy[f]	*Chrysanthemum leucanthemum*	Y	B	Eradication by 2007	Y/Eradication	Y
Perennial Sowthistle	*Sonchus arvensis*	Y	C	NA		N
Poison Hemlock	*Conium maculatum*	Y	C	NA		N
Quackgrass	*Elytrigia repens*	Y	B	NA		N
Redstem Filaree	*Erodium cicutarium*	Y	B	NA		N

Table 2 (continued). Noxious Weeds Occurring at the Rocky Flats Site

Common Name	Scientific Name	CO Noxious Weed List[a]	CO List[b] (A, B, or C)	CO State Management Plan Goal[c]	JeffCo[d] Noxious Weed List/ Control	Rocky Flats Weed Problem[e]
Russian olive	*Elaeagnus angustifolia*	Y	B	NA		Y
Saltcedar	*Tamarix ramosissima*	Y	B	NA	Y/Eradication	Y
Scotch thistle	*Onopordum acanthium*	Y	B	NA	Y/Control	Y
Yellow starthistle[g]	*Centaurea solstitialis*	Y	A	Eradication	Y/Eradication	Y

[a]Noxious weeds as listed by the State of Colorado Noxious Weed Act (CNWA). Rules updated in 2005 (Title 8 *Code of Colorado Regulations* [CCR] Part 1203-19), 2006 (8 CCR 1206-2), and 2007 (8 CCR 1206-2).
[b]Noxious weeds in Colorado are ranked on different lists—A, B, or C—depending on how problematic they are. The lists are provided in the CNWA and are typically updated annually.
[c]This category states what the State Weed Management Plan (SWMP) goal is for this species in the part of Jefferson County where Rocky Flats is located. NA means there either is no SWMP for this species or it is not applicable to the site in Jefferson County. The SWMPs are outlined in the CNWA.
[d]Rocky Flats is in Jefferson County (JeffCo), Colorado.
[e]This category is used for species not on the CNWA lists, but that are problematic at the site.
[f]This species was last observed on the site in the 1990s. It has not been observed since then.
[g]This species was eradicated from the site in the past and has never been seen since.
Plant nomenclature follows that of GPFA (1986), Weber (1976), and Weber (1990), in that order of determination.

3.0 Vegetation Management

Table 1 lists the weed and vegetation control methods currently in use at Rocky Flats. The weed control measures in this section are listed in the order they should be considered from an integrated weed management viewpoint, starting with the least toxic, nonchemical measures.

3.1 Administrative and Cultural Weed Management Actions

Administrative and cultural weed management actions are incorporated into this plan with the intention of preventing the introduction and spread of weeds at Rocky Flats. The preventive actions incorporated into this Vegetation Management Plan are listed in Table 3.

Table 3. Preventive Actions for Weed Control

Type of Action	Explanation
Weed-free materials	All revegetation projects at the site will use weed-free seed and mulch sources. Seed mixes will be composed of native species appropriate for the locations.
Approved seed mixtures only	All seed mixtures for site revegetation projects must be approved by the Rocky Flats ecologist. Use of native species will be required in all cases, except when specific written prior approval has been obtained from the Rocky Flats ecologist.
Sterile mulch	All straw and other mulch materials used on the site will be weed-free.
Follow-up weed control	Weed control and reseeding should be a part of all revegetation efforts for a minimum of 2 years after their initiation.
Immediate eradication of new species	Any new noxious weed species found on the site will be controlled immediately to reduce their populations and prevent their future increase.

Revegetated areas will be monitored to evaluate the success of the revegetation and monitoring results will be used to determine if future management actions are needed. When warranted, weed control and reseeding of these areas will be conducted to establish the desired native plant species.

The following graminoid species shall not be used in seed mixtures for revegetation projects on site:

- Annual rye grass *Secale cereale*
- Bulbous bluegrass *Poa bulbosa*
- Crested wheatgrass *Agropyron desertorum* or *Agropyron cristatum*
- Intermediate wheatgrass *Agropyron intermedium*
- Johnsongrass *Sorghum halepense*
- Orchardgrass *Dactylis glomerata*
- Quackgrass *Agropyron repens*
- Sheep fescue *Festuca ovina*
- Smooth brome *Bromus inermis*
- Timothy *Phleum pratense*
- Wild proso millet *Panicum milaceum*

The use of a sterile hybrid of wheat known as ReGreen is allowed under certain conditions at Rocky Flats; however, prior approval from the Rocky Flats ecologist is required.

3.2 Physical or Mechanical Control

3.2.1 Mowing

Some areas along Rocky Flats roads may be mowed to keep the weeds cut back. There are several purposes for mowing roadsides. Properly timed mowing can stress weeds and impact seed-set of these undesirable plants, which aids in the control of noxious weeds. For practical travel safety reasons, keeping roadside vegetation cut low in some areas is also needed. Mowing road edges increases visibility of wildlife crossing the roads and can help reduce collisions between wildlife and cars; mowing also provides better visibility at intersections. Reduction of roadside vegetation height also reduces the available fuel at the margins of the firebreak and gravel roads, functionally enhancing their ability to impede the spread of wildfires and aiding firefighters in extinguishing fires in these lower-fuel buffer areas. Mowing and weed-whacking may also be conducted in native grassland or revegetation areas as needed to control weeds when this method is effective.

In addition to the fuel reduction actions already discussed, weeds and debris that have accumulated in fences will be removed as needed. This removal may include physical removal or prescribed burning of such debris out of fences in situ. Fuel reduction shall occur as needed. Vegetation debris *shall not* be tossed loose or disposed of *anywhere* except in appropriate waste containers destined for off-site landfill disposal. Prescribed burns, if permitted on site, will

require an approved, prescribed burn plan and conform to policies outlined in DOE Order 450.1A, *Environmental Protection Program.*

3.2.2 Prescribed Burning

The use of prescribed burns on Rocky Flats grasslands is highly recommended as a management tool to help control weeds, reduce plant litter, recycle nutrients, and improve the health and vigor of the native plant communities. Weed control strategies that focus solely on the weed species and not on enhancing conditions for desired native species will provide only limited success. If desired native species are not able to fill in the openings created in the native plant communities after target weed species are eliminated, then often other undesirable weeds will take the place of the target species. The tools available for resource management at the site are currently limited by site policies. This is especially true with regard to grassland resource management where the natural process of fire is essential for prairie health. Prescribed burns, if permitted on Rocky Flats, will require an approved prescribed burn plan and must conform to policies outlined in DOE Order 450.1A. Additional state or local permits will be obtained as required and coordination will be conducted with site contractors and surrounding landowners as needed.

3.2.3 Hand Pulling/Control

Hand pulling/control may be used on small infestations where practical and when pulling has been shown to be an effective control measure. If weed species that are being hand pulled have already set seed, then they shall be disposed of in appropriate waste containers destined for off-site landfill disposal.

3.3 Biological Controls

3.3.1 Biological Control Insects

Biological control agents (i.e., insects) are being used at Rocky Flats to assist in the control of musk thistle, bull thistle, St. John's-wort, dalmatian toadflax, Canada thistle, field bindweed, and diffuse knapweed. The insects have been provided to the site by the Colorado Department of Agriculture and U.S. Fish and Wildlife Service (USFWS) through an agreement with Texas A&M University to target specific weed infestations. Table 4 lists the biological controls that have been released at Rocky Flats.

It is recommended that cooperative efforts with these groups continue with regard to the release of biological control agents for weed control at Rocky Flats. Additional releases of insects and other biological control agents for the above-listed and other species could increase the effectiveness of the weed control efforts while potentially reducing costs. Communication with local researchers who are evaluating the use of biocontrols on nearby open space properties is recommended to keep abreast of any new findings and techniques.

Table 4. Biological Control Agents Released at Rocky Flats

Target Species	Beneficial Organism	Effect
Diffuse knapweed (*Centaurea diffusa*)	Urophora quadrifasciata	Attacks knapweed flowers, producing galls that reduce seed production.
	Urophora affinis	Attacks knapweed flowers, producing galls that reduce seed production.
	Sphenoptera jugoslavica	Beetle larvae bore into root crown and upper roots of knapweed, retarding plant development and stunting growth.
	Larinus minutus	A seedhead weevil.
	Cyphocleonus achates	A root-boring weevil.
Musk thistle (*Carduus nutans*)	Rhinocyllus conicus	A weevil that eats the seeds in the musk flower heads.
	Trichosirocalus horridus	Weevil that attacks the crown of musk thistle, thus killing the apical meristem and reducing the potential of the plant to flower.
Bull thistle (*Cirsium vulgare*) Canada thistle (*Cirsium arvense*)	Urophora stylata Urophora carduii	A gall fly that attacks flower heads and reduces seed set. A gall fly.
	Cassida rubiginosa	A defoliating beetle.
St. Johnswort (*Hypericum perforatum*)	Chrysolina quadrigemina	A foliage-feeding beetle.
Dalmatian toadflax (*Linaria dalmatica*)	Calophasia lunula	Larvae of this moth feed on the leaves and flowers of the plant.
	Mecinus janthinus	A stem-mining beetle.
Field bindweed (*Convolvulus arvensis*)	Aceria malherbae	A gall mite.

3.3.2 Grazing

Similar to the use of prescribed burning, grazing is highly recommended as a management tool to help control weeds, reduce plant litter, recycle nutrients, and improve the health and vigor of the native plant communities. As stated earlier, weed control strategies that focus solely on the weed species and not on enhancing conditions for desired native species will provide only limited success. Grazing is a management tool that has not been and is currently not allowed at Rocky Flats. Grazing may be proposed to become part of the management toolbox at Rocky Flats in the future. The USFWS may graze cattle on the Rocky Flats National Wildlife Refuge at some point in the future.

3.3.3 Interseeding

Interseeding is defined as seeding additional species into an already established plant community. With respect to weed control, this may be done to help establish new desirable vegetation more quickly so that it can fill the voids and empty spaces created by the removal of weed species. The use of native desirable species will accomplish this purpose at the site when it is conducted.

3.4 Chemical Controls

Table 5 lists the herbicides approved for use on the site. Herbicides *not* on the current list *may not* be used until they are approved pursuant to the Rocky Flats Chemical Management Plan.

Many of these chemicals are restricted-use herbicides and must be applied only by a licensed (certified) applicator. Such restricted-use herbicides may not be applied on site by unlicensed applicators. Empty containers may not be washed on site, and used containers must be removed by the applicator at the end of the work shift. Disposal of restricted-use herbicides is strictly the responsibility of the applicator. The selected herbicides and application rates are based on the best available information, herbicide labels, and recommendations from experts (Beck 1992, 1996a, 1996b, 1997a, 1997b, 2001, CNAP 2000).

Table 5. Approved Herbicides for Use at Rocky Flats (Last Updated 5/5/08)

Herbicide Name	Active Ingredient
Aquatic 2,4-D	2,4-Dichlorophenoxyacetic acid
Banvel	Dicamba
Clarity	Diglycolamine
Escort	Metsulfuron
Garlon 3A	Triclopyr
Habitat	Imazapyr
Karmex	Diuron
Milestone	Aminopyralid
Navigate	2,4-Dichlorophenoxyacetic acid
Oust	Sulfometuron
Plateau	Imazapic
Redeem	Chlopyrilid + trichlopyr amine
Rodeo	Glyphosphate
Roundup	Glyphosphate
Telar	Chlorsulfuron
Transline	Clopyralid
Tordon 22K	Picloram
Vanquish	Diglycolamine

The following compounds were removed from the approved list in 2007 based on recommendations from the herbicide subcontractor: Arsenal (Imazapyr), Barricade (Prodiamine), Buctril (Bromoxyni), Gallery (Isoxaben), Sahara (Diuron; Imazapyr), and Surflan (Oryzalin). These compounds were used prior to and throughout site closure but have limited use given the current resource management objectives. These compounds could be added back to the list if they were needed.

Chemical controls have been used effectively in the past at Rocky Flats to control various noxious weed species. Proposed herbicide application locations will be developed on the basis of noxious-weed-mapping results and field observations.

3.5 Vegetation Management and the Preble's Mouse

The Preble's meadow jumping mouse (*Zapus hudsonius preblei*) is a listed threatened species under the Endangered Species Act. The USFWS must be consulted before weed control activities are conducted in Preble's mouse habitat at Rocky Flats. In 2006, DOE-LM received concurrence to conduct weed control activities in Preble's mouse habitat as outlined in the *Biological Evaluation for Weed Control in Preble's Mouse Habitat at the Rocky Flats, Colorado, Site* (DOE 2006; USFWS 2006). In 2007, DOE-LM received concurrence to continue weed control

activities in Prebles' mouse habitat according to the guidance outlined in the *Amendment to the Biological Evaluation for Weed Control in Preble's Mouse Habitat at the Rocky Flats, Colorado, Site* (DOE 2007, USFWS 2007). All weed control activities at the site that take place in Preble's mouse habitat are required to follow the guidance provided in these documents. The USFWS must be consulted before any changes or modifications can be made to the weed control activities as outlined in these documents.

4.0 References

DOE Order 450.1A. *Environmental Protection Program,* June 4, 2008.

Beck, K.G., 1992. *Weed Management for Small Rural Acreage Owners*, Colorado State University Cooperative Extension, No. 3.106, Ft. Collins, Colorado.

Beck, K.G., 1996a. *Russian Knapweed*, Colorado State University Cooperative Extension, No. 3.111, Ft. Collins, Colorado.

Beck, K.G., 1996b. *Canada Thistle*, Colorado State University Cooperative Extension, No. 3.108, Ft. Collins, Colorado.

Beck, K.G. 1997a. *Diffuse and Spotted Knapweed,* Colorado State University Cooperative Extension, No. 3.110, Ft. Collins, Colorado.

Beck, K.G., 1997b. *Musk Thistle*, Colorado State University Cooperative Extension, No. 3.102, Ft. Collins, Colorado.

Beck, K.G., 2001. *Biology and Management of the Toadflaxes*, Colorado State University Cooperative Extension, No. 3.114, Ft. Collins, Colorado.

CNAP, 2000. *Creating an Integrated Weed Management Plan: A Handbook for Owners and Managers of Lands with Natural Value,* Caring for the Land Series, Vol. 4, Colorado Natural Areas Program, State of Colorado, Denver, March.

Davis, M.A., J.P. Grime, and K. Thompson, 2000. "Fluctuating resources in plant communities: a general theory of invisibility," *Journal of Ecology*, 88: 528–534.

DOE (U.S. Department of Energy), 2006. *Biological Evaluation for Weed Control in Preble's Mouse Habitat at the Rocky Flats, Colorado, Site,* Office of Legacy Management, Grand Junction, Colorado, April.

DOE (U.S. Department of Energy), 2007. *Amendment to the Biological Evaluation for Weed Control in Preble's Mouse Habitat at the Rocky Flats, Colorado, Site,* Office of Legacy Management, Grand Junction, Colorado, February.

GPFA, 1986. *Flora of the Great Plains*, 2nd printing with 1991 supplement, Great Plains Flora Association, University Press of Kansas, Lawrence, Kansas.

USFWS (U.S. Fish and Wildlife Service), 2006. Concurrence letter for the *Biological Evaluation for Weed Control in Preble's Mouse Habitat at the Rocky Flats, Colorado, Site,* USFWS Letter ES/CO: T&E/Rocky Flats MS 65412 LK, Ecological Services, Colorado Field Office, Lakewood, Colorado, April 25.

USFWS (U.S. Fish and Wildlife Service), 2007. Concurrence letter for the *Amendment to the Biological Evaluation for Weed Control in Preble's Mouse Habitat at the Rocky Flats, Colorado, Site,* USFWS Letter ES/CO: T&E/Rocky Flats TAILS: 65412-2006-I-0031, Ecological Services, Colorado Field Office, Lakewood, Colorado, April 4.

Weber, W.A, 1976. *Rocky Mountain flora*, Colorado Associated University Press, Boulder, Colorado.

Weber, W.A, 1990. *Colorado flora: Eastern Slope,* University Press of Colorado, Niwot, Colorado.